1. Project Name: Manele SBH

2. Date of Inspection: June 10, 2005

3. Inspection Personnel:

Name	Agency/Office	Telephone No.
a. Dan Meyers	CEPOH-EC-T	438-8875

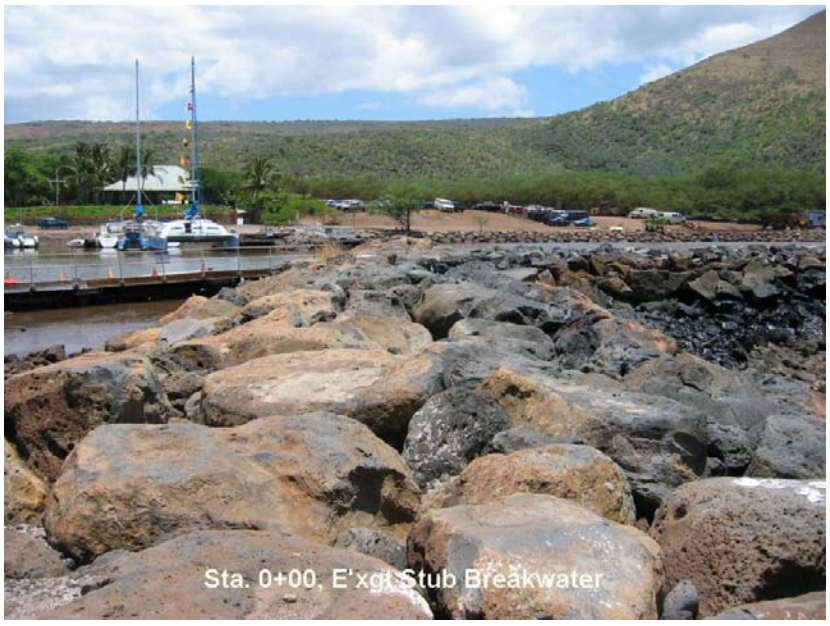
4. Discussion:

The breakwater has poor contact and armor sizing throughout the structure. This breakwater is not typical of the keyed and fitted construction used on other POH projects. The construction style is more of the random dumped armor stone type.

Maintenance dredging was completed May 2005. A fiber optic cable (owned by Pacific LightNet Communications) was located in the entrance channel and portions of entrance channel dredging were omitted from the contract.

New deficiencies were noted on this inspection and are indicated. The Oceanside (OS) of the structure at Sta. 4+95 thru Sta. 5+70 has dramatic changes this inspection and has deteriorated drastically.

Conducted site inspection and noted the following (All Photographs are FY05 unless stated):



a. Overview at start of the existing Stub Breakwater from trunk to root. Ocean side is to the right, and harbor side is to the left.

b. Overview at end of project from trunk to head. Ocean side is to the right, and harbor side is to the left.

c. Sta. 1+09, HS, dislodged armor stone 3’ from toe. Void is half way up side slope.

d. Sta. 1+15, OS, dislodged armor stone w/ voids, lower sideslope failure. Additional settling at sideslope new this year.

e. Sta. 1+40, OS, sideslope failure. 8 LF hinge to toe under layer exposed.

f. Sta. 1+41, HS, Sideslope settling, new this year.

g. Sta. 1+65, Crest settling, new this year.

h. Sta, 2+00, Hinge movement, new this year. Reference wooden stake.

i. Sta. 2+20, OS, 2 flipped armor stones on side slope.

j. Sta. 2+44, OS, side slope steepening. Void under side slope. Under layer not exposed. (Adjacent white cross)

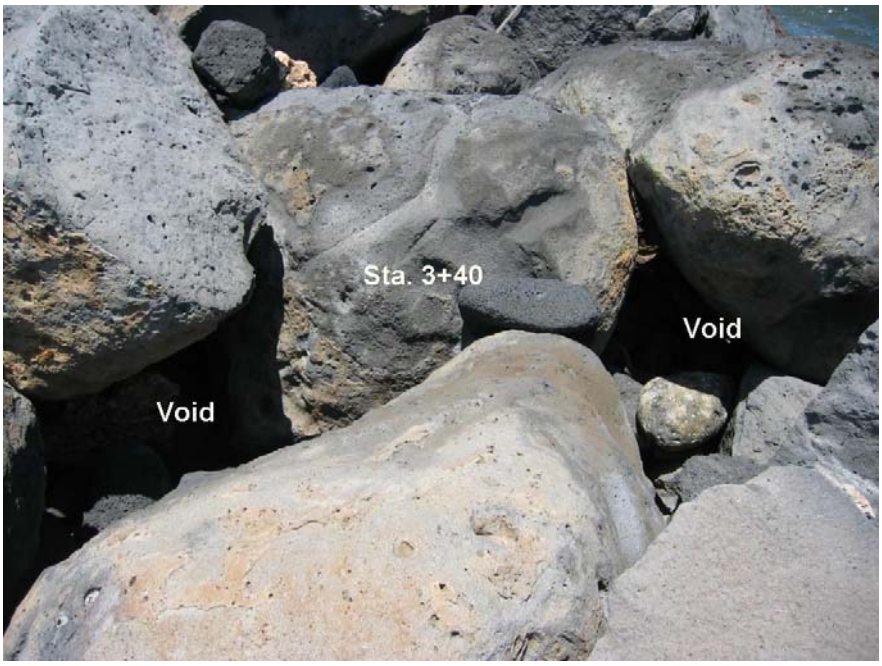
k. Sta. 2+65, Pervious inspection was void at crest, new deficiencies is OS, sideslope failure.

l. Sta. 2+65, HS, dislocated armor stones from sideslope, additional movement this inspection.

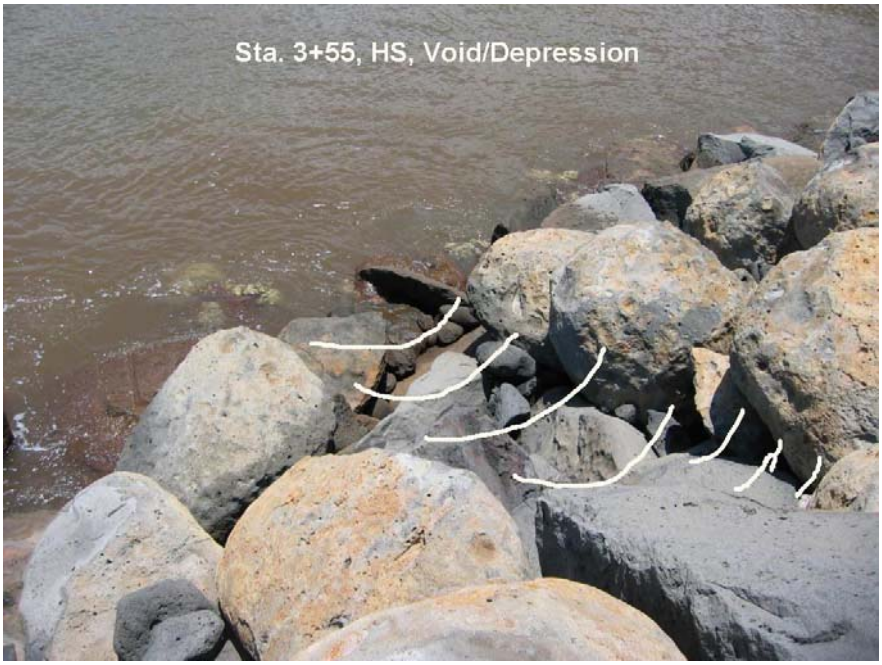
m. Sta. 2+70, Crest settling, new this year.

n. Sta. 3+01, OS, 1 armor stone resting at hinge, bridging.

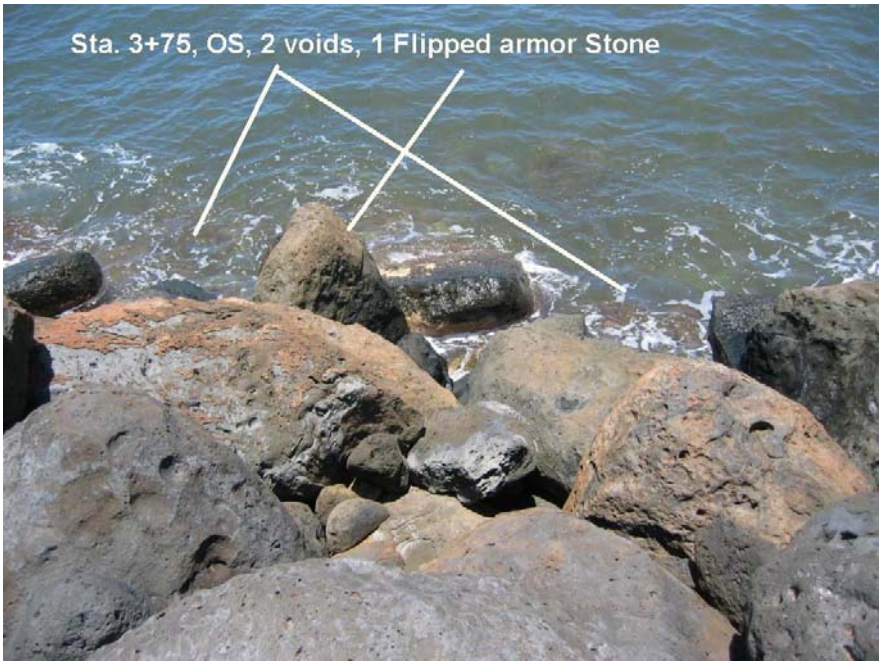
o. Sta. 3+10, Void centerline of crest, new this inspection, adjacent white cross.



p. Sta. 3+40, 2 large voids at center line of crest. No Change.



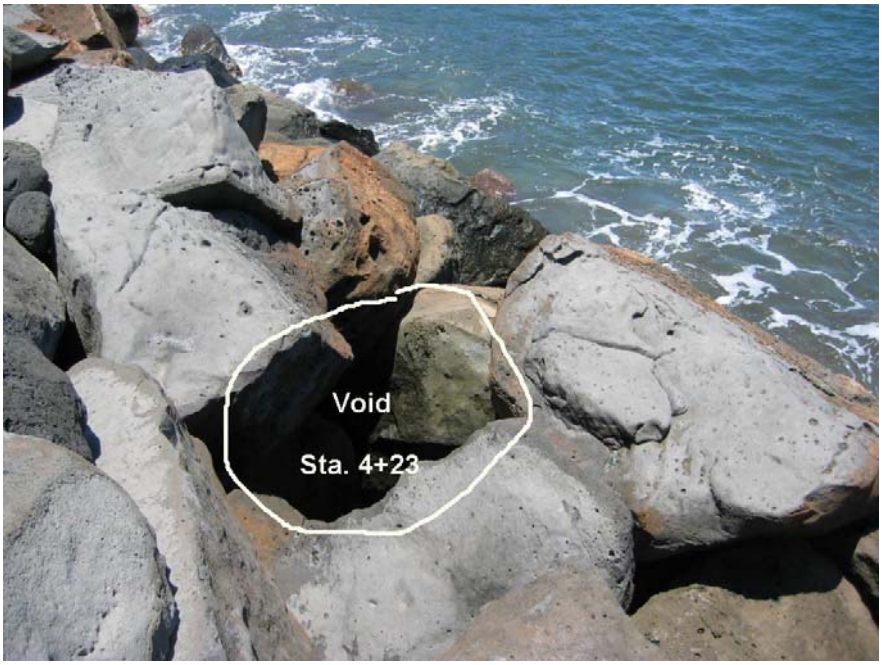
q. Sta. 3+55, HS, Large void/depression on sideslope.



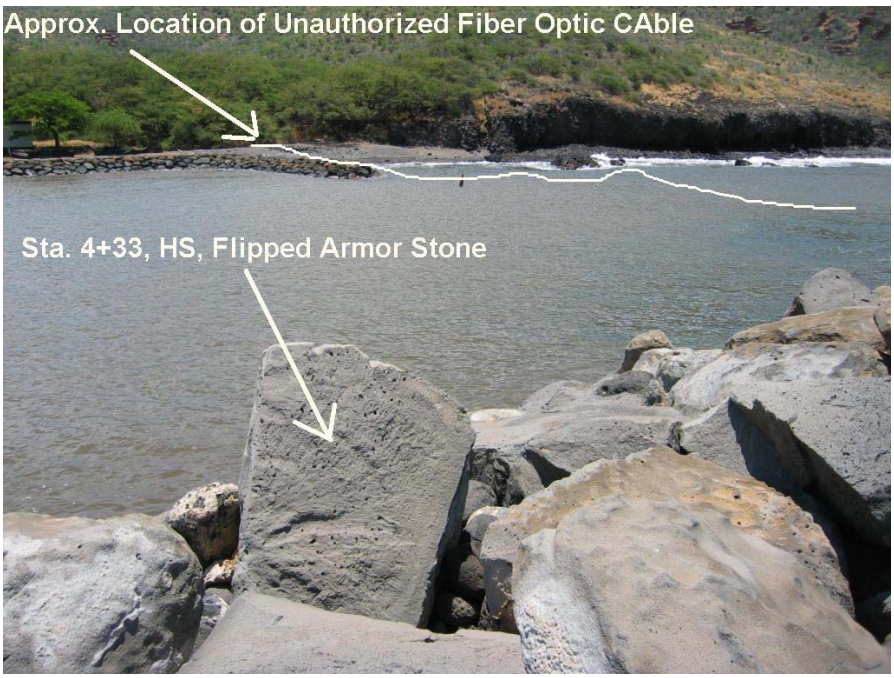
r. Sta. 3+75, OS, 2 voids, 1 flipped armor stone.

s. Sta. 4+01, OS, 1 fracture armor stone at hinge.

t. Sta. 4+22, OS, 1 armor stone dislodged resting on side slope, 1 fractured armor stone, void at waterline.



u. Sta. 4+23, OS, hinge, void.



v. Sta. 4+33, HS, flipped armor stone.

w. Sta. 4+53, HS, sideslope, 1 ea. Flipped armor stone w/void. New.

x. Sta. 4+58, OS, sideslope settling, new this year.

y. Sta. 4+51, OS, large void with exposed under layer. Dislocated armor stone is resting on side slope, which is also steepening.

z. Sta. 4+95, OS, sideslope movement, 1 - split armor stone. FY 04 Photo.

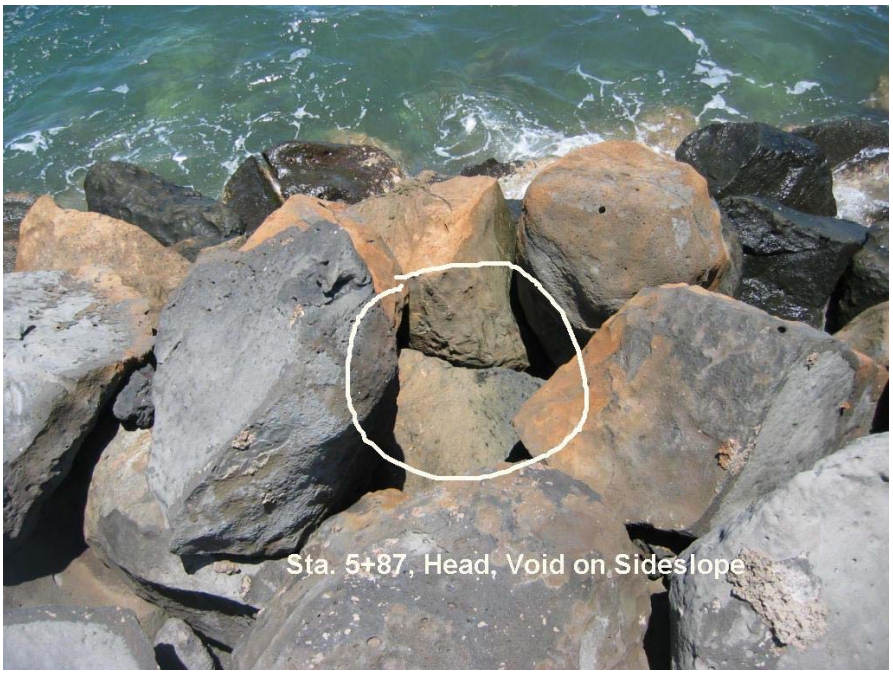
aa. Sta. 5+00, HS, sideslope settling.

bb. Sta. 4+95 – Sta. 5+70, OS, major armor stone movement, sideslope, settling, sideslope failure.

cc. Sta 5+80, additional crest settling under NavAid foundation this year.

dd. Sta. 5+80, OS, Southwest corner of foundation. BW settling.

ee. Sta. 5+87, picture taken from 22 degrees HS to 22degrees OS at the head of the structure. There is a possibility of a missing layer of armor stones at water line.



ff. Sta. 5+87, picture taken from top of monument at 20 degrees HS to centerline of head at 0 degrees. There is a possibility of a missing layer of armor stones at water line.

gg. Sta. 5+87, picture taken from top of monument at center line of head at 0 degrees to 22 degrees OS. There is a possibility of a missing layer of armor stones at water line.

hh. Reference Photo, Head to Root OS.

ii. Reference Photo, Head to Root HS.

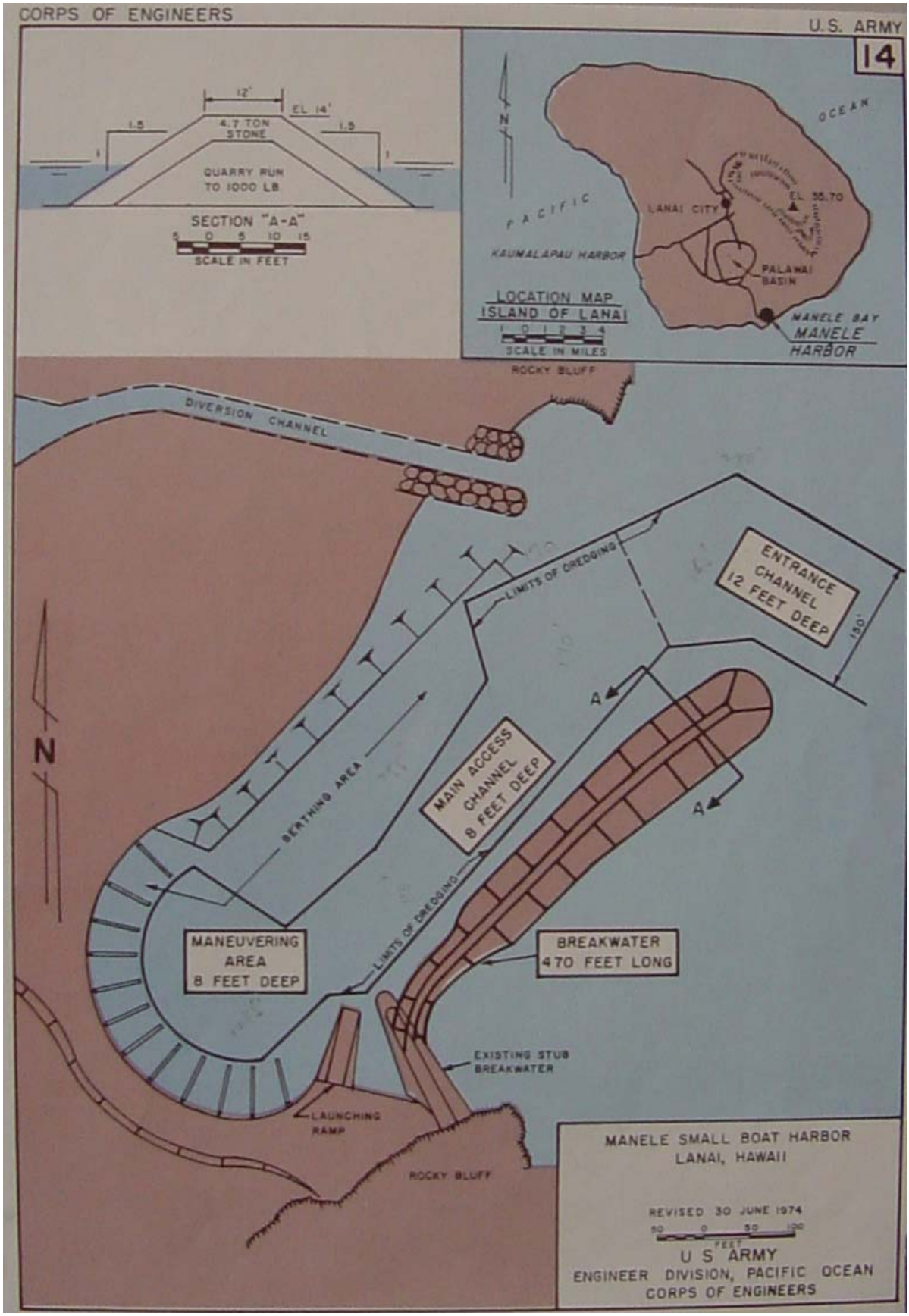
5. Conclusion:

After review of the past O&M inspections it appears the project was constructed with "extreme" randomness with respect to the armor stone placement and the noted items, while not the result of wave energy, are being exacerbated by wave action. The armor stones are not keyed and fitted resulting in loose and undersized which cause rocking. The lack of interlocking stones has created large voids, bridging, perched rocks, and exposed under layers and cores to direct wave action. The past photos reveal a steady decline in the contact of the armor stones. There has been a significant change in Sta. 4+95 to Sta. 5+70, OS, this year. An additional inspection should be conducted.

Signed: _____
Dan Meyers, CEPOH-EC-T

Signed: _____
James Pennaz, P.E., Ch, CEPOH-EC-T

Enclosure(s)
1. Site Plan (8½"x11")
2. Fact Sheet Dated June 2002 (8½"x11")


CORPS OF ENGINEERS
U.S. ARMY
14
12'
EL 14'
1.5
4.7 TON STONE
1.5
QUARRY RUN TO 1000 LB
SECTION "A-A"
5 0 5 10 15
SCALE IN FEET
N
OCEAN
PACIFIC
LANAI CITY
EL 38.70
KAUMALAPAU HARBOR
PALAWAI BASIN
MANELE BAY
MANELE HARBOR
LOCATION MAP
ISLAND OF LANAI
1 0 1 2 3 4
SCALE IN MILES
ROCKY BLUFF
DIVERSION CHANNEL
LIMITS OF DREDGING
ENTRANCE CHANNEL 12 FEET DEEP
150'
A
A
N
BERTHING AREA
MAIN ACCESS CHANNEL 8 FEET DEEP
LIMITS OF DREDGING
MANEUVERING AREA 8 FEET DEEP
BREAKWATER 470 FEET LONG
EXISTING STUB BREAKWATER
LAUNCHING RAMP
ROCKY BLUFF
MANELE SMALL BOAT HARBOR
LANAI, HAWAII
REVISED 30 JUNE 1974
50 0 50 100
FEET
U S ARMY
ENGINEER DIVISION, PACIFIC OCEAN
CORPS OF ENGINEERS

MANELE SMALL BOAT HARBOR, LANAI, HAWAII

CONDITION OF IMPROVEMENT 30 SEPTEMBER 1989

PREVIOUS PROJECTS: None.

EXISTING PROJECT: Authorized on 6 May 1963 under Section 107 of the River and Harbor Act of 1960. Provides for extension of an existing 100-foot long stub breakwater with a 470-foot rubblemound breakwater with crest elevation of 14 feet at the head and 6 feet at the root; an entrance channel 12 feet deep; and a main access channel and maneuvering areas, 8 feet deep.

PROGRESS OF WORK

Completed and Under Maintenance: The project was completed in December 1965. Last maintenance dredging was completed in December 1985; total material dredged was 2,000 cubic yards.

Work Remaining: None.

COST OF CONSTRUCTION:

Completed Works:	New Work	Maintenance	Total
United States Funds	$353,000	$423,622	$ 776,622
Contributed Funds			
Required	370,845	0	370,845
Other	5,446	11,735	17,181
Total Costs	$729,291	$435,357	$1,164,648

RANGE OF TIDES: The range of tide between mean lower low water and mean higher high water is 1.8 feet. The extreme range is 4.0 feet.